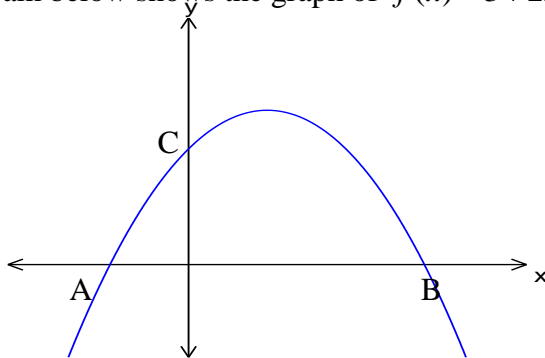


## National 5

### Homework AP6

1.
  - (a) £6000 is placed in a deposit account paying 4% compound interest per annum. How much is in the account after 4 years?
  - (b) The population of a town is 54 000 at present. It is estimated that the population is growing at 3% p.a.  
What is the expected population 5 years from now? Answer correct to two significant figures.
  - (c) Another town has population 80 000 at present. It is estimated that the population is declining at 2% p.a. What is the expected population 5 years from now? Answer correct to two significant figures.
  - (d) The value of the machinery in a factory is £240 000 at present, and is depreciating at the rate of 10% p.a.  
The machinery will be replaced at the end of the year when its value falls below £160 000.  
How many years before this will happen?
2.
  - (a) A car costs £16 000 new. Its value depreciates by 35% in the first year and 20% in each subsequent year.  
Find the value after 3 years, correct to 2 significant figures.
  - (b) A piece of art is valued at £4 300 at present.  
If its value appreciates at 6% p.a., find the value after 4 years, giving your answer correct to 2 significant figures.
  - (c) The value of an investment has fallen by 12% over the last year.  
If it is now worth £7 040, what was the value one year ago?
  - (d) The value of a piece of electronic equipment depreciates by 10% p.a.  
If it is now valued at £8 748, what was its value when new 3 years ago?
  - (e) A savings account pays compound interest at a fixed rate of 3% p.a.  
If the account has value £13 506.10 at present, how much was deposited 3 years ago?
3. The diagram below shows the graph of  $f(x) = 3 + 2x - x^2$ .

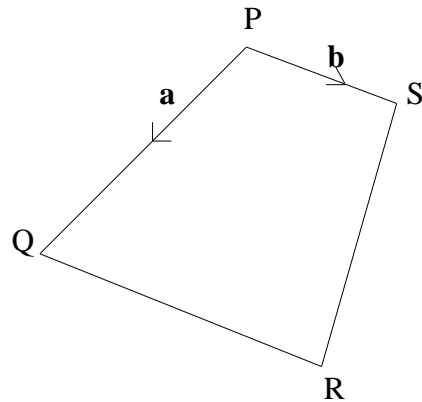


The graph crosses the  $y$ -axis at C and the  $x$ -axis at A and B.

- (a) Find the coordinates of A, B and C.
- (b) Find the equation of the axis of symmetry.
- (c) Find the coordinates of the maximum turning point.

4. A quadratic function has equation  $f(x) = (x+1)^2 - 9$ .
- Write down the equation of the axis of symmetry.
  - Write down the coordinates of the turning point, stating whether it is a maximum or minimum.
  - Find the coordinates of the points where the graph crosses the coordinate axes.
  - Use the above information to sketch the graph of  $f(x)$ .
5. At the carnival the height  $H$  metres, of a carriage on the big wheel above the ground is given by  $H = 10 + 5 \sin t^\circ$ ,  $t$  seconds after starting to turn.
- Find the height after 10 seconds.
  - Find the two times during the first turn when the carriage is  $12.5$  metres above the ground.

6.



In the diagram  $\overrightarrow{PQ}$  represents the vector **a** and  $\overrightarrow{PS}$  represents the vector **b**.

$\overrightarrow{QR} = 2\overrightarrow{PS}$ . T is the point on QS such that  $\overrightarrow{QT} = \frac{2}{3}\overrightarrow{QS}$ .

- Give expressions in terms of **a** and/or **b** for
    - $\overrightarrow{QR}$
    - $\overrightarrow{PR}$
    - $\overrightarrow{QS}$
    - $\overrightarrow{QT}$
    - $\overrightarrow{PT}$
  - Using your answers to (ii) and (v) show that  $\overrightarrow{PT} = k\overrightarrow{PR}$  and evaluate  $k$ .
  - What conclusion can be made about T?
7. (a) On the same coordinate diagram, draw accurate graphs of each of these straight lines.
- $y = x + 2$
  - $2x + y = -4$
- (b) Use your answer to part (a) to solve the simultaneous linear equations

$$\begin{aligned} y &= x + 2 \\ 2x + y &= -4 \end{aligned}$$